DOCUMENT RESUME

ED 447 301 CE 080 935

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TITLE Learning Organisations for a Knowledge Economy: The Role of National Technological Institutes of Higher Education in the 21st Century.
PUB DATE 2000-04-10
NOTE 13p.; In: Cross-Roads of the New Millennium. Proceedings of the Technological Education and National Development (TEND) Conference (2nd, April 8-10, 2000, Abu Dhabi, United Arab Emirates); see CE 080 883.
PUB TYPE Opinion Papers (120) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Change; Communications; Developed Nations; Developing Nations; Foreign Countries; *Higher Education; Information Technology; *Institutional Role; National Programs; *Technical Institutes; *Technological Advancement; Technology; *Technology Education
IDENTIFIERS Learning Organizations; National Development

ABSTRACT

International civilization is undergoing fundamental changes enabled by the revolution in information and communication technology. National institutions and education systems are challenged to mediate the changes' impact. National institutes of technology (NITs) of higher education can help nation states reposition in the global economy, if they become learning organizations. The information and communications technological revolution has created a power vacuum requiring creation of new international policies and systems and international organizations to codify and distribute intellectual capital. Advanced technological education is recognized as a key strategy for promoting and achieving transition to a knowledge economy. Development of sustainable, advanced knowledge industries requires these special services from higher education NITs: advance knowledge through collaborative, interdisciplinary scholarship; build NIT's international reputation for scholarship; develop curricula around graduate profiles defined by national policies, industry needs, and advice from professions; encourage research into pure, strategic, applied, and professional challenges evident in the international context; provide multiple entry and exit points; and promote technological capacities. NITs can sustain provision of relevant services if they are regularly repositioned by effective governance and deliberately reorganized through effective management and evaluation. (YLB)

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ED 447 301

TEND 2000

Crossroads of the New Millennium

Learning Organisations For A Knowledge Economy: The Role Of National Technological Institutes Of Higher Education In The 21st Century

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Monday 10 April, 2000

Workshop 1

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Abstract

This paper has three major arguments. We are in the midst of fundamental changes to our international civilisation. These changes are being enabled by the revolution in information and communication technology. National institutions and education systems are being challenged to mediate, facilitate and moderate the impact of these changes. It can be tentatively concluded that national technological institutes of higher education can help nation states reposition in the global economy, and help develop new forms of governance and international relationships. The caveat is that they will only be able to do this if they themselves become learning organisations, and constantly develop new internal organisational structures and external relationships as their purposes and roles change in the 21st Century.

Learning Organisations for a Knowledge Economy: The Role of National Technological Institutes of Higher Education in the 21st Century

When the themes of this conference were announced, I was immediately impressed by their strategic implications. Having been involved for decades in professional and organisational development, I felt it important to review primary purposes and organisational forms in higher education, and to predict changes to national institutes of technology given the impact of information and communication technology.

I looked at how the leading universities of the 21st Century are repositioning and reorganising themselves to achieve changing purposes. This meant considering their research strategies, how they intend to develop new curricula and delivery structures and make use of teaching and learning technologies. When I related probable organisational assumptions to the already evident impact of information and communication technology, it became clear that national institutes of technology will have a special role to play - to help their nations to make the transition towards a knowledge economy.

When I contrasted knowledge-driven economies with industrial, agrarian or extractive economies, it became clear how wealth is increasingly being created from new raw materials and production processes. This also helped explained the booming demand for educated 'knowledge workers' and why nation states must actively manage the transition processes. And a key international transition strategy is to have higher education institutes of technology play a strong role in developing advanced knowledge industries.

The next task was to clarify how institutes of technology might be repositioned and reorganised to successfully discharge such a role. Appropriate research, teaching, curriculum, and structural strategies had to be identified, along with effective governance, management and evaluation processes.

To reiterate, this paper has three major arguments and a conditional conclusion. We are in the midst of fundamental changes to the international structures of our current civilisation. These changes are being enabled by the nature of information and communication technology and being driven by economic globalisation. National institutions and systems are being challenged to mediate, facilitate and moderate the impact of these changes so that nation states can reposition themselves in the global economy, and help develop new forms of governance and international relationships.

The caveat is that they will only be able to do this if they themselves become learning organisations, and constantly develop new internal organisational structures and external relationships.

Two phrases require careful definition at this point; "knowledge economy" and "learning organisation." Throughout this paper the phrase "knowledge economy" is used rather than "information economy". When data is organised for specific use, it becomes information. When the quality of information is also provisionally guaranteed for particular purposes, it becomes knowledge. When the conditional nature of knowledge is known with some certainty, along with a sophisticated appreciation of its relativity and the consequences of its circumstantial use, it becomes wisdom. Since business enterprises and governments tend to rely on reasonably trustworthy and economically-critical "facts", and yet tend to give less consideration to ethically-, politically- and socially-critical dimensions, then term "knowledge economy" is probably more appropriate than "information economy" or "wisdom economy".

A "learning organisation" has been defined[1] as one that learns through the convergence of personal mastery, mental models, building shared vision, team learning, and system thinking. Personal mastery is held to be the "discipline of continually clarifying and deepening our personal vision, of refocussing our energies, of developing patience, and of seeing reality objectively ... it is the essential cornerstone of the learning organisation - the learning organisation's spiritual foundation." (p.7) Similarly, "working with mental models starts with turning the mirror inward; learning to unearth our internal pictures of the world, to bring them to the surface and hold them rigorously to scrutiny." (p. 9).

An effective vision binds people together in shared enterprise, and provides principles and goals or aims that guide practices. It gives meaning to commitment, legitimates action and acts as the moral glue for accountability. "When there is a genuine vision (as opposed to the all-too-familiar "vision statement"), people excel and learn, not because they are told to, but because they want to." (p. 9). Hence, team learning begins when members meet, share assumptions, make all ideas group property, and then, together, select the combination that cohere best as a vision, goals, strategies and objectives. "Team learning is vital because teams, not individuals, are the fundamental learning unit in modern organisations." (p. 10)

[1] Senge, P. (1990) *The fifth discipline: The art and practice of the learning organisation*. New York: Doubleday.

Finally, the 'fifth discipline' of "systems thinking makes understandable the subtlest aspect of the learning organisation - the way individuals perceive themselves and the world. At the heart of the learning organisation is a shift of mind - from seeing ourselves as separate from the world to connected to the world, from seeing problems as caused by someone or something 'out there', to seeing how our actions create the problems we experience. A learning organisation is a place where people are continually discovering how they create their reality. And how they can change it." (p. 13)

THE NATURE OF 20TH CENTURY UNIVERSITIES

Current evidence[2] suggests that universities are being both internally reorganised and externally incorporated in global networks, especially to deliver services in partnerships with giant multi-national communications companies. Leading international research universities are already networking their pure or "blue skies" research. This activity, and associated curriculum development, is driven by academic staff motivated to create fresh knowledge and international research reputations. The leaders of their universities are planning to capture new global markets. Curricula are being developed around the emergent constructs of disciplines and being promoted using global branding.

At the same time, academic structures are being reinforced to deliver degree and postgraduate level study, preserve standards and reward mastery. Students continue to be expected to acquire and demonstrate cognitive understanding in international contexts. In sum, university globalisation strategies are being enabled by information and communication technology while continuing to rely on traditional research, teaching and curricular structures. Two examples illustrate these strategies.

Britain's Open University[3] is now 30 years old and regarded internationally as highly successful. When I completed my BA in mathematics and management in 1976 with the OU, it was five years old and had about 50,000 students. Today it has over 165,000 students and an annual income of over £200 million.

[2] Oblinger, D.G. and Katz, R.N. (Eds.) (1999) *Renewing administration: Preparing colleges and universities for the 21st century*, Bolton, Mass.: Anker.

[3] Goddard, A. (1999) Being as good as the best, *Times Higher Education*, 5 November, p. 6.

Despite this 'runaway success' the OU is planning massive expansion, both at home and abroad. At home it is planning to offer vocational sub-degree courses called 'associate degrees', lifelong learning opportunities over the web, and a foundation degree in medicine. Abroad it is developing partnerships with a range of real and virtual institutions, and national systems of higher education. In essence the Open University is diversifying at home and exploiting its brand value globally. Many of its strategies are being emulated.

Universitas 21 is a more recent global network of 18 comprehensive and research intensive universities. It plans to exploit collective brand values, market student places internationally, and increasingly deliver learning by the web.[4] It is currently consulting with additional potential members, considering more formal form of incorporation, and discussing a partnership with Rupert Murdoch's giant telecommunications multi-national company, News Corporation.[5]

There are a number of implications in these and many other examples. These globalisation strategies are primarily enabled by emergent information and communication technologies. They will, nevertheless, continue to build on the old; the research and teaching interests of academic staff, the disciplines and structures of academic culture, and the tradition in universities of stressing cognitive understanding rather than vocational application.

There are three relatively new aspects: global branding and marketing, international curricula valued in knowledge economies, and web-based teaching and learning. And as they diversify their funding sources internationally, universities are becoming less subject to the governance of nation states. This growing ambiguity in university sovereignty is symptomatic of growing concerns about the laissez faire nature of the global economy.

Before discussing the transformative potential of information and communication technology, it should be noted that higher education institutions vary quite markedly in their capacity to govern and manage change. It is also clear that higher education institutions and systems have both diversified and provided for mass access in recent decades. This has led to institutional responsiveness in many settings, and been achieved through internal differentiation and expansion.

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[4] http://www.universitas.edu.au/index.html

[5] Maslen, G. (1999) Moguls court U21, *Times Higher Education*, 19 November, p.6.

In other settings reforms have followed authoritative advice[6] and been managed by system responsiveness, and achieved through nationally co-ordinated differentiation between institutions and by establishing new national institutions. Germany and Italy, for example, have significantly expanded existing universities while establishing new universities in recent years.[7]

This paper does not arbitrate the relative benefits and limits of institutional versus systemic responsiveness but simply acknowledges that both institutions' and systems' capacities to adapt, respond, compete and innovate vary widely.

THE TRANSFORMATIVE EFFECTS OF INFORMATION AND COMMUNICATION TECHNOLOGY

Historically, radical technological advances have always fundamentally affected trade, redistributed power, altered geopolitical processes and changed the nature of organisations.[8] There are many examples available. I will draw on two.

The first industrial revolution in England 200 years ago triggered demands from frightened people who had been suddenly exposed to laissez faire business rules. They demanded more democratic forms of government. They wanted governments that would shape and moderate the effects of technological change. They insisted on more people being able to elect representatives. They called for curbs on the power of capital, greater legal protection of personal, communal and property rights, and national systems of education to codify and share intellectual capital.

In effect, the first industrial revolution created a power vacuum that was gradually filled by new national polities, national policymaking, and state organisations that implemented policies for the common good, for the common wealth.

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[6] Kerr, C., Grade, M.L. and Kawaoka, M. (1994) *Higher education cannot escape history: Issues for the 21st century*. Albay, NY.: SUNY Press, and Halsey, A.H. (1995) *Decline of donnish dominion: The British academic professions in the 21st century*. Oxford: Clarendon Press.

[7] Gellert, C. (Ed.) (1999) *Innovation and adaptation in higher education: The changing condition of advanced teaching and learning in Europe*. Gateshead, UK, Athanaeum Press.

[8] Woodward, J. (1958) *Management and technology*. London: Her Majesty's Stationery Office.

Today, information and communication technologies are being used to globalise trade but they are creating another power vacuum. In Seattle last December, at the World Trade Organisation meeting, we heard demands from interest groups and nations frightened by the laissez faire nature of economic globalisation.[9] They want proper representation in international bodies, like the G7 and the WTO, curbs on the powers of multi-national companies and large trading nations, debt retirement, and far better protection of small economies and the environment. And while these political dynamics were enabled by the web, they are yet to be structured and legitimated with formal authority. It is also clear from the way the Mafia is using the internet that new international polities and operational rules for commerce are required.[10]

In sum, the information and communications technological revolution has created a power vacuum that now requires the creation of new international polities and systems, and international organisations to codify and distribute intellectual capital for the common good. An early step towards providing intellectual capital for the international common wealth is to develop understandings of knowledge economies.

THE NATURE OF AN ADVANCED KNOWLEDGE ECONOMY

In essence, an advanced knowledge economy exists wherever the production and exploitation of knowledge dominates the creation of wealth. Highly successful knowledge economies are seen in countries where transitions from industrial, agrarian and extractive bases have been most successfully managed. The crucial implication for institutes is that providing advanced technological education is increasingly recognised as a highly effective national transition management strategy.

To elaborate, intellectual capital or knowledge is the primary resource of advanced information economies. Knowledge is created and developed by four forms of scholarship; discovery, integration, application and teaching.[11] High quality scholarship is typically indicated by the presence of clear goals, adequate preparation, appropriate methods,

[9] Elliot, L. (1999) Unless the World Trade Organisation cleans up its act there will be more issues for the protesters to trade on, *Guardian Weekly*, December 9-15, p. 12.

[10] Carroll, R. and Atkinson, D. (1999) Mafia money vanishes into cyber space, *Guardian Weekly*, 16-22 December, p. 5.

[11] Boyer, E.L. (1990) *Scholarship Reconsidered: Priorities of the Professoriate*, San Francisco, Calif.: Jossey-Bass.

significant results, effective presentation, and reflective critique.[12] And, when the creation of wealth in a nation is primarily driven by quality scholarship combined with business enterprise, including e-business,[13] it has an advanced knowledge economy.

Advanced knowledge economies work in unique ways. The raw materials of industrial economies include minerals, energy, finance and skilled labour. Agrarian economies depend heavily on agricultural products. Extractive economies rely heavily on energy and mineral sources. Knowledge economies, however, use data, information, images, symbols and culture as raw materials. Educated people then use computers to manipulate these raw materials to develop and deliver valued products and services. This helps explain why many multi-national companies and governments now share the assumption that demand for the education and re-education of 'knowledge workers' is growing in ways that will transform education into a boom industry in the global economy.

This is why advanced technological education is increasingly recognised internationally as a key strategy for promoting and successfully achieving the transition to a knowledge economy. In the next section I argue that this will be achieved providing technological institutions adopt a role carefully differentiated from that of research universities.

THE POTENTIAL ROLE OF TECHNOLOGICAL HIGHER EDUCATION INSTITUTES

The development of sustainable and advanced knowledge industries requires special services from higher education institutes of technology.[14] The nature of these services can also help these institutions specialise, differentiate and market internationally to their competitive advantage.

First, instead of participating primarily in pure or "blue skies" competitive research, institutes of technology should advance knowledge through collaborative and interdisciplinary scholarship, including discovery research. And to accelerate national capacity building, such activity should systematically involve post graduate students.

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[12] Glassick, C.E., Huber, M.T. and Maeroff, G.I (1997) *Scholarship Assessed: Evaluation of the Professoriate*, San Francisco, Calif.: Jossey-Bass.

[13] Clague, M.C. (1999) Understanding e-business. In D.G. Oblinger and R.N. Katz, (Eds.) *Renewing administration: Preparing colleges and universities for the 21st century*, Bolton, Mass.: Anker, pp. 45-61.

[14] The argument in this section draws in part on recent policy research reported in Brooks, D. (1999) The Auckland Institute of Technology in transition, unpublished EdD thesis, Charles Sturt University.

Second, instead of building on the fame of researchers, institutes of technology should build the institution's international reputation for scholarship. This would mean giving parity of esteem to all four forms of scholarship and driving up their quality using a range of mechanisms. An example of such a mechanism is to reconstruct the nature of academic staff development mindful of seven challenges: [15]

i. widespread availability of computer-based access to information,
ii. increasing diversity in the student body,
iii. the demand to learn off-campus,
iv. the need to accredit prior learning,
v. the need to build generic or personal transferable skills into courses,
vi. the move towards strategic alliances beyond the university, and,
vii. changing career paths for academic staff.

Third, instead of allowing curricula to evolve as a byproduct of disciplinary research, institutes of technology should develop curricula around graduate profiles defined by national policies, industry needs and advice from the professions. This will require formal institutional commitment to consultations and action research processes.

Fourth, rather than funding "blue skies" research driven by academic interests, institutes of technology should encourage research into pure *and* strategic *and* applied *and* professional challenges that are evident in the international context. Again, this will require sustained involvement of user advisory groups and systematic institutional policy research.

Fifth, rather than use traditional structures to govern access to advanced knowledge, institutes of technology should deliberately provide multiple entry and exit points to vocational and professional preparation. They could also consider developing wider inter-institutional linkages, as in the United States. They often include programmatic, academic and professional links governed variously by formally and legally based policies, state systems policies, voluntary agreements between institutions, and agreements about vocational-technical credit transfer.[16]

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[15] Candy, P. (1997) Some issues impacting on university teaching and learning: Implications for academic directors. In S. Armstrong, G. Thompson and S. Brown (Eds.) *Facing up to radical changes in universities and colleges*, London, UK.: Kogan Page/ SEDA, pp. 170-177.

[16] Kintzer, F.C. and Wattenberger, J.L. (1985) *The articulation/ transfer phenomenon: Patterns and directions*, Washington, DC: AACU, ED 275 539.

Sixth, and finally, institutes of technology should promote technological capacities, including knowledge, skills and attitudes, as being as important as cognitive understandings. Overall, given the potential scale of these six aspects of reform, many institutes of technology will need to be repositioned and reorganised.

RE-POSITIONING AND REORGANISING NATIONAL INSTITUTES OF TECHNOLOGY

It will not be possible for national institutes of technology to sustain the provision of relevant services if they themselves are not regularly repositioned by effective governance, and deliberately reorganised through effective management and evaluation. My concluding advice follows.

Repositioning will involve the processes of reviewing and revising the fundamental purposes of national institutions or systems, and in particular, revising their appreciation of their national and international context, and appropriate development strategies. Governors of national institutions and systems will have to reconcile urgent international trends and opportunities with changing conceptions of national interests, and provide clear policies and effective leadership.

Reorganising will involve adjusting organisational structures and service delivery arrangements to respond to both fresh challenges in the workplace and understandings about pedagogy. This will mean applying emergent knowledge of two different realms; economies in transition, and how students and staff learn in open, asynchronous and flexible environments.

System and institutional managers will face complex challenges. The first point is that the situation is just too complex for any CEO or system manager to fully comprehend, control or be solely responsible for. They need the support and guidance of highly expert and representative governors, clear policy making processes and expert executive support staff.

Conversely, CEOs and system managers need to reciprocate by providing philosophical clarity, strategic analyses and political services to governors, institutional middle managers and colleagues. And as understandings of policy develop, CEOs and middle managers will need to mobilise and monitor change using cultural, managerial and evaluation processes.

In sum, CEOs and system and middle managers will have to serve as educative leaders in order to create and sustain the radical degrees of professional development and organisational learning required. Such educative leadership[17] boosts organisation learning through coherent philosophical, strategic, political, cultural, managerial and evaluation activity.

TENTATIVE CONCLUSIONS

This paper offered three main arguments:

- We are in the midst of fundamental changes to our international civilisation.
- These changes are being enabled by the nature of information and communication technology.
- National technology institutions and systems can mediate, facilitate and moderate the impact of these changes.

It also reached a conditional conclusion:

- National technological institutes of higher education can help nation states reposition in the global economy, providing they become learning organisations.
- Finally, these arguments and conclusion are interim answers to four questions that deserve further debate. These questions will also bear revisiting:
- How is information and communication technology affecting nations?
- What are the characteristics of an advanced knowledge economy?
- What roles are technological higher education institutes playing in the development of advanced information economies?
- How are national institutes of technology being repositioned and reorganised?

[17] Duignan, P.A. and Macpherson, R.J.S. (Eds.) (1992) *Educative Leadership: A Practical Theory for New Educational Administrators and Managers*, Basingstoke: Falmer.